Unit 1: Applied Linguistics: Learning a Language

Listening 1: Student Presentation.
Listening for the Key Components of a Presentation

Are you or do you know anyone who is bilingual? I speak French very well, but I don’t consider myself bilingual. I was interested in talking to people who grew up speaking two languages and who are equally comfortable in the two languages and then finding out about their affiliation to their two language communities. Basically, my research question was, did they have a stronger affiliation to one or the other? Today I’m reporting on my study of Spanish–English and Hindi–English bilinguals here at the university.

In my study, I looked at bilinguals’ affiliation to a language community when growing up and now and in the future. I looked at the correlation between beliefs and their ideas about the importance of maintaining or increasing their proficiency in Language A, either Spanish or Hindi. When I say Language A, I mean the language they speak other than English.

I included 11 people in each group, so 22 people overall. I gave participants a survey, and I interviewed them. First, I wanted to find out how and when they used Language A outside of the home when they were growing up. I asked: “Did you have neighbors who spoke Spanish (or Hindi)? Did you have classmates who spoke Spanish (or Hindi)?”

In terms of results, for the Spanish speakers, only 3 of 11 answered yes to those two questions. Most didn’t grow up in a bilingual community. This was the same for the Hindi speakers. Most of the participants only used their home language with parents or their parents’ friends, not with their classmates or friends. They used English with classmates or friends. Another interesting finding was that many said they spoke and continue to speak English with their siblings. What I’m stressing is that most of the participants grew up in inte . . . , in an integrated community in terms of language.
Another point of my research was to see if they thought they would maintain opportunities to use Language A in the future. For this point, I asked: “Do you think we... Do you think you will live in a country where Spanish, or Hindi, is spoken?” and “Do you think you will raise your children to be bilingual?” Only one person said he or she would live in a Hindi-speaking country—which is basically, India, right? Whereas several of the Spanish-English bilinguals said they would live in a Spanish-speaking country, only 2 in each group said they would definitely not raise their children bilingual. One in this group said: “I’m not sure if I’m proficient enough to bring up my children with that language.”

The majority of the participants sampled seem to be pretty invested in thinking that bilingualism is a good thing, you know, overall, something they would want to pass on to their children. In the interviews, that fact comes out, so I was also interested in how these beliefs correlate with how important it is to them to maintain both languages or increase their proficiency in Language A. After all, most said they really only used Spanish, or Hindi, with their elders, so I really do wonder how realistic it is to think... that they can maintain the language other than English.

To get an idea of their investment in keeping up with Language A, I asked them what organizations—religious, cultural, or other—they belonged to and where they used Spanish or Hindi. I also asked them how likely they might be to marry someone who is bilingual in English and Language A. It turns out that there was a definite correlation between these two questions. The 3 people who said that they were involved in religious organizations were the ones who said that they were also likely to marry someone from their culture.

When asked to rate how important—with 1 being not important and 5 being extremely important—it is to maintain both languages, those with the highest ratings were also those who belonged to outside organizations and were somewhat more likely to marry someone from their culture.

In addition to this, those who grew up in a truly bilingual community also rated on the high end. So what do these results tell us about bilinguals’ affiliations to their two language communities? My conclusions are that people who are raised in a bilingual community, are more involved in a bilingual community, or who see themselves becoming more involved in the future are also more concerned with maintaining Language A, be that Hindi or Spanish. This is important to me because, as a future ESL schoolteacher, I want to find ways to support my students’ proficiency in English while also helping them to maintain their home languages.

Thank you.
You’ve wondered, haven’t you, how it is that children are able to acquire a language, apply the unspoken rules to the language, and then by a very young age have a fairly complete mastery of their language? How about adults learning a second language? Are these two things the same processes? These are some of the questions we’ll look at in today’s class.

Now, there are many divergent views on these topics and, as you’ll see, especially when it comes to adults learning a second language, the views are often contradictory. This really isn’t surprising. There is really no way we can get into our brains, can we? What we can do is look for evidence in the language we use that may support one or another theory about how, uh, about how language is actually learned.

All right, first, let me ask you, how many of you have kids? A few of you. Okay, as we talk about first language acquisition, try to think about whether what I’m talking about applies to what you have observed with your own children. As a linguist, my kids became the subject for my research. All parents are amazed at how fast their kids learn, but I was constantly analyzing what mine said. My home was like my laboratory.

So now, what about learning a second language? How many of you have studied another language? Okay. I’ll have you draw on those personal experiences later as we talk about theories of second language acquisition this afternoon. So how is it that by the age of six, children have a grammar that approximates that of an adult? Well, there are differing views on how this happens. One, proposed by renowned linguist, um, Noam Chomsky, is called universal grammar. He argued that people are born with the rules of a universal grammar that are then fine-tuned to the languages children hear from their caregivers.

It’s, it’s sort of a case of narrowing the more general rules to the language or languages that one is exposed to as a child. But, one of the questions that arises is whether or not this same process happens when learners are older—post-puberty, say. This doesn’t mean that the grammar of all languages is identical, does it? What it means is that the number of possibilities of language rules is finite. Children acquire language very quickly, and, in Chomsky’s view, far too quickly to be explained by the exposure they have to language in their environment. What do you think? Do children have to have heard something in order to produce it? Absolutely not. Children can create innumerable unique utterances based on a relatively small number of examples from their environment. They go through stages of development that tend to be similar across languages. For
example, children learning any language tend to make use of the same limited set of meanings in their early sentences, okay? Let’s look at some.

One of ’em relates to ownership: Dadda’s shoes. Another describes events: Me fall. In early language children also use labeling: That dog. Another is locational relationships: doll box. You’ve noticed that these are all two-word sentences, right?

Another pattern in early speech is that children learn the ends of words more quickly—so, for example, nana for banana, mato for tomato. This is evident even in languages when the first syllable of a word is always stressed.

So, Chomsky. Chomsky’s work came as a reaction to a psychological theory that was popular in the ’40s and ’50s. It was called behaviorism. This is the whole stimulus-response model, you know, if you reward a dog, for example, enough, then the behavior will become automatic. The belief was that if you imitate language accurately and get rewarded—maybe through praise from a parent—you’ll learn the language. This theory just doesn’t explain what happens with children though, does it?

You already know, right, that much of what children produce in their language at a young age is not what you’d call grammatical? If language learning were through a process of imitation, how is that my son would say: We broughted the cookies? What’s interesting here is that while my son’s comment on the cookies isn’t grammatical, it’s understandable—he gets his message across. And his deviation from the grammatical norm is reasoned. It shows evidence that he’s working things out in the language. Okay, let’s look more closely at this. What is the time reference here? Present or past?

Student: Past.

Professor: And how do you know that?

Student: Because your son put the ed on the end of the verb.

Professor: So what’s deviating from the norm? He added the past tense ed marky, ed marker to the irregular verb bring, right? I know this is obvious, but this tells us that he isn’t imitating language. He’s acquiring patterns of the language. Here that the ed means past, right? So he’s heard the irregular form and maybe he doesn’t realize that there’s any difference between bring and brought yet. Okay, now later on, maybe even in a matter of months, he’ll be saying, We brought the cookies as he fine-tunes his language.

Another view of the, uh, behaviorists was that children’s language develops through feedback—that’s the response part of the process. That means that, as parents correct their kids, they’ll correct their language errors, right? Wrong. Research, um, research has shown that young kids don’t tune into our feedback at all and, in fact, parents of small children don’t typically correct them. And if they
do, the kids don’t pay attention to the correction; they pay attention to the meaning. Here’s an example to show you what I mean.

A 3-year-old says: I clean my room, mommy.
And the mom says: No, I cleaned my room.
The 3-year-old says: Not you, I clean my room.
[laughs]

There is some evidence that suggests that there are some constraints to the number of rules a language uses, that there’s this universal grammar. In many parts of the world, something called language pidgins develop. This is when people come together who don’t have a common language, but they have to communicate, usually for some economic reason. What emerges in this situation is a language with a shared vocabulary and radically simplified grammar. People may form their sentences differently, but using the same vocabulary words allows them to get their immediate needs met. When children are born into these communities where the adults speak a pidgin, the children will expand the grammar of that pidgin, and this new language is called a creole. The children will share the vocabulary with their parents, but they won’t share the grammar. This indicates that there’s this natural human phenomenon to find a way to create systematic patterns, or rules, to govern sentences that can, um, can be understood by others. Again, these kids didn’t learn this by imitating input from their parents. There was something innate about it.

Let’s move on to second language acquisition, SLA. Many of you have studied or are studying a second language, right? Learning a second language—and maybe a third or fourth for some people—can be very different for kids and adults. You’ve met families new to the United States and then been astounded at how quickly the children seemed to pick up English, haven’t you? But then when you meet the parents of the same kids, it can be surprising to see how much they’re struggling to communicate in English. But it shouldn’t be a surprise. We’ll look at those same theories about the process of learning a second language.

There are those in the field of SLA who believe that there is a critical period for learning languages. It is suggested that at around the age of puberty, significant brain developments make the language acquisition process more difficult. And, those who believe in a strong version of this hypothesis believe that people can never reach complete mastery of a language if they start learning it after puberty. Others believe in a weak version, which is that mastery will be more difficult but not impossible after that time. Native-like pronunciation, in particular, is often thought to be the most difficult aspect of the language to acquire for a learner who’s past that critical period for language learning.

You can think of this critical period as the closing off of the optimal learning period. We’re going to look at this theory a little more closely. Here’s a question.
Does this work the same for people learning a language in a country where the target language is spoken as a first language? In other words, is it the same thing for those immersed in the target language, day in and day out, as it is for those learning it as a foreign language? Think about individuals studying it in a classroom for three or four hours a week who then go home and use their first language. It’s not the same, is it? Well, let’s see what other factors may affect language learning or acquisition for those beyond the age of puberty.

To illustrate, how about considering some scenarios of second language learners in the U.S. learning English? So first we have a young girl who spends all day in an English-speaking, um, elementary school. She is bombarded with English all day and is surrounded by pictures and words on the walls of her classrooms. She has the opportunity to communicate in English with her peers, you know, in classrooms, at lunch, on the playground. Of course school environments are particularly conducive to promoting language acquisition, but clearly this child is getting a lot of exposure to English on a daily basis. You’d agree, right?

Okay, now compare her to her mom, who is a newly arrived refugee. She’s never studied English or any other language formally becoming, before coming to the U.S. She’s home with the smaller kids and, of course, she’s using her first language to communicate with them. Makes sense, right? Overall, she gets much less exposure to English on a daily basis. So, in this scenario, is it the age of these two learners that would affect language learning, or is it the amount of exposure to the target language?

Now compare that mom to someone from Europe, say, who moves here to the United States to join her family. Say she completed graduate studies in her native language of German but also studied some English in college. She’s an adult learning English, but how is her situation different from the refugee’s?

They’re both adults, but the German student has prior experience learning a foreign language, and she has extensive experience in a formal classroom setting. So, given these examples, it’s clear that when we think about language learning, we need to look at more than just age.

Researchers have proposed many theories of second language acquisition over the past several decades. I have to say there’s been virtually no agreement on any one particular theory. For the rest of the lecture, we’re gonna look at the two camps—the social interactionists and nativists. Social interactionists view language as an activity learned in interaction with others, whereas nativists see language ability as this innate capacity to generate grammatically appropriate sentences.

Let’s take the nativists first. Just as with first language acquisition, those who could take, ah, an innatist or nativist view believe that we are biologically pro-
grammed to be able to acquire language, and not just our first language. They would disagree with the behaviorists. The behaviorist view had a strong influence on language teaching in the 1960s and '70s, and it's still found today in language classrooms all around the world. Methods of teaching that rely heavily on drills and memorization are influenced by this theory. But, as with kids, we have evidence that adults actually learn through a more cognitive process.

In other words, they're trying to make sense of the language and they're able to create innumerable unique utterances based on a limited amount of input. By that, I mean, they say far more than what they hear in their classrooms or learn in their language textbook. That's why they make so many mistakes. And they should. Mistakes are evidence of learning. In practice, some approaches to teaching that are influenced by this theory suggest that adult learners need abundant meaningful input and will not benefit from a lot of error correction.

Interactionists generally agree with innatists that an optimal learning environment is one where learners are receiving a lot of comprehensible and meaningful input. Interactionists also believe that those learning a second language need meaningful interactions with other users of the language. In these interactions, people try to negotiate meaning to get their messages across. They might simplify what they say, or paraphrase, right? They might ask the other person to clarify something that they haven't understood or they might do comprehension checks, right? They might slow down or speak more deliberately. You often see people do that when they talk to non-native speakers of the language, right? Speaking more slowly and loudly isn't probably the best strategy, but saying something a different way or maybe slowing things down—well, it really can help. All of these are what linguist Michael Long calls interactional modifications. Interactionists see a similarity with first language acquisition as well, suggesting that these are the same kinds of modifications mothers make as they communicate with their children.

Both of these theories have had a strong influence on current practices in language teaching, where the focus is more on developing communicative competence in a language rather than explicitly learning grammatical rules. In a communicative classroom, language learners are ideally picking up the grammar of the language. They just aren't talking about the rules of the language necessarily. For example, uh, for example, you can use the past perfect correctly and in a meaningful way without necessarily knowing that the form is called past perfect, right?

Oh, I see that we're out of time. I'll see you next time.
More and more people are seeking refuge from big city life and moving to areas that are in or near forests or on remote mountains. Part of the ecology of a forest is fire, so when you mix humans and forests, the risk of damage to homes and death from fire increases. According to climate experts, 400 million acres of the earth are burned each year due to wildfires. What causes these wildfires? What are the stages of a wildfire and how can they be extinguished? What steps should people take in preparation for or during a wildfire? I’d like to provide some answers based on my research in this brief presentation.

What are the primary causes of wildfires? Wildfires often start when lightning strikes and ignites trees or wood, particularly in dry areas. They can also be started accidentally by humans who don’t extinguish a fire properly at a camp-ground, for example. Those accidental fires can originate from a number of things: cigarette embers, trash fires and hot ashes, lightning, even arson. In some parts of the world, forests are burned to gain agricultural land, but subsequently the fire goes unchecked. Initially, wildfires may start and not be noticed for awhile. When this happens, they can spread very quickly, burning brush, trees, and homes in their path. Some researchers suggest that global warming is contributing to the increase in the number of wildfires in recent years. They speculate that the higher global temperatures are leading to drier forests and grasslands, fueling fires even more.

The first stage of a wildfire is called the ground stage. Due to its small size, a fire at this stage may be very difficult to detect. If found, it can be fairly easy to extinguish, but often these fires move to the next stage, what is called the surface stage. This type of fire burns approximately four feet in height and while not too difficult to extinguish, it has the potential to grow if there are nearby fuel sources.

As soon as a fire begins burning the tops of trees, it has become what we call a crown fire. This type of fire is very hard to control, especially if there are high winds, which causes what is called spotting. Spotting is when the wind blows large embers of a crown or surface fire ahead of the wildfire, causing it to spin out of control.

Now let me turn to some of the science of a wildfire. Why is it that some fires burn slowly while others quickly turn into infernos? Simply put, fire is a chemical reaction whereby energy in the form of heat is produced. The chemical combination of oxygen with the burnable elements in the forest results in
combustion, a chain reaction that is actually similar to photosynthesis, but in reverse. Combustion releases heat. It’s the amount of heat produced in a fire that makes fires so hard to put out and why it needs to be done by experienced people.

Firefighters say there are three elements required for combustion to take place: There must be fuel to burn, there must be air to provide oxygen, and there must be heat. These three elements make up the “fire triangle.” A fire needs all 3 elements to burn. If one is weakened, the fire is weakened; if one is intensified, the fire will intensify.

When a wildfire has started, firefighters try to remove the oxygen side of the triangle by smothering the fire with a retardant—foam, dirt, or water in a fine spray or fog. Retardants protect the fuel from heat, and as heat is reduced, so is the flow of oxygen. Retardants work better when, than water because water can turn a lot of heat into a hot gas, which gets distributed to the atmosphere.

The most common way to suppress a wildfire is to remove the fuel source, even though it does not always completely extinguish the fire. This is usually done by building a fire line, usually made by a bulldozer or by hand. When the fire burns up to the fire line and encounters no more fuel, the fire stops spreading, which allows firefighters to then take other steps to put the fire out.

While you may not be a homeowner in a remote area and so not worried about wildfires, you could still find yourself in danger if you are a hiker or camper. In fact, 2,000 campers had to be evacuated from campsites in the south of France when rampant wildfires spread in the summer of 2010. So what should you do in the event that a wildfire strikes where you are? To start with, if you are advised by the local authorities to evacuate an area, do so immediately. As you leave, choose a route that is going away from the fire, and pay attention to changes in wind speed as well as the direction you see smoke going. Before you go out, be sure to wear protective clothing such as sturdy shoes, a long-sleeved shirt, and long pants.

What do you if you are caught in your car during a wildfire? Of course this is dangerous, but, when this happens, you are better off staying in the car than trying to escape on foot. Make sure to close all air vents in the vehicle. When driving away, put on your headlights and drive very slowly. If you must stop, it’s imperative that you park far from heavy brush or trees. After you have shut off the ignition, leave the headlights on and then get out, get on the floor, and cover yourself with a blanket or coat.

Finally, what you should do if you are caught out in the open? The best shelter then is an area with the least fuel for the fire. That means, the first thing to do is to try to find an area where dry brush, branches, and trees are scarce. If you are hiking on a mountain, the back side of the mountain, away from the fire, is
safer. Also try to avoid being trapped in a canyon as canyons will act as natural chimneys. If there is a road nearby, the best thing to do is to lie face down in a ditch or along the roadside and try to cover yourself with anything that could protect you from heat. Look for the lowest possible spot and stay down until the fire passes.

In conclusion, being familiar with the causes of wildfires and their stages can help you prepare for one. Thank you.

[Track 5]

Listening 3: Lecture: What Causes Tsunamis?

In our last lecture, when we looked at the processes underlying volcanic eruptions, I mentioned tsunamis because volcanic eruptions can be one of the causes of a tsunami. Today, we’ll look specifically at what a tsunami is and what the causes are. I’m going to guess that until 2004 when that horrible tsunami hit in the Indian Ocean, they weren’t really on your radar screen, were they?

Well, the Japanese did have tsunamis on their radar. Japan has experienced the devastating effects of tsunamis on a number of occasions, including the one in 2011. When more than 225,000 people in 11 countries die from a natural disaster, well, it gets everyone’s attention. The tsunami in 2004 brought to the surface many issues in terms of natural disasters and their impact on developing countries—in particular, the fact that disaster-preparedness or early-warning infrastructures are insufficient or lacking in some of these countries. We may actually touch on that last bit today.

Have you ever wondered what the word tsunami means? It’s the Japanese word for “harbor wave.” Tsunamis were sometimes referred to as tidal waves by the general public in the past, but this is a misnomer. While it’s true that the impact of a tsunami on a coastline is dependent on the tidal level at the time a tsunami strikes, tsunamis are actually unrelated to tides. The scientific community often used the term seismic sea wave, but this is also misleading as it suggests that there is always an earthquake-related generation mechanism. The fact is that a tsunami can also be caused by a non-seismic event—maybe a landslide, sudden failure of a dam or a dike, or impact from a meteorite. But 75 percent of tsunamis occur because of undersea earthquakes.

So what are tsunamis? Well, basically, uh, they are huge ocean waves, as high as 30 feet. Now, unlike wind-generated waves, they are caused by some sudden motion or disturbance on the ocean floor. According to emergency management officials, when an undersea earthquake or major disturbance causes a sudden change on the ocean floor, the water above rises or sinks, which creates a series of very strong waves to develop. There are these, um, subduction zones in the
Indian and Pacific Oceans. These are where two tectonic plates meet and one moves under the other, sometimes only by centimeters. Look at Slide 1.

The mantle is just below the crust of the earth. As you can imagine, there is enormous friction generated between what we call the subducting plate, the one that slides under, and the overriding plate, the one that remains on the top. This friction prevents the two plates from moving at a slow and steady rate. Instead, the two plates become stuck, or blocked, which is shown here in Slide 1. As indicated, as this blocked plate descends into the mantle, there’s a slow distortion of the overriding plate. Then, in this slide, 2, the surface of the ocean floor pushes up. See this bump? The result is an accumulation of energy. We call this accumulated seismic energy. Think of it as the energy stored in a compressed spring. This energy can accumulate in the overriding plate over a long period of time—sometimes decades or even centuries. When energy accumulated in the overriding plate is, is greater than the force that has been holding these two plates together, the overriding plate snaps back into an unrestrained position. This sudden motion gives an enormous shove to the overlying water and is the cause of the tsunami. So now, we’ve got a problem.

Remember that we already talked about what happens on land when there’s an earthquake. An earthquake with a magnitude of between 9.1 and 9.3 was the cause of the tsunami in 2004, with its epicenter in Sumatra, Indonesia. The 2011 Honshu, Japan earthquake, by the way, was 9.0, the 5th largest since 1900. So . . . far and away, the majority of tsunamis occur in the Indian and Pacific Oceans.

In fluid mechanics, tsunamis are described as solitary waves, as opposed to, uh, regular waves generated by wind or the dropping of a heavy object in water. A solitary wave is an enormous single wave that stays intact as it travels, as opposed to the regular waves you see crashing on the shore when you’re at the beach. As such, solitary waves pack an enormous amount of energy into a single devastating wave. Because of its wave properties, a tsunami can easily travel at more than 800 kilometers an hour. They can propagate at extremely high speeds and travel transoceanic distances with limited loss of energy.

Keep in mind too that in deep ocean water, any boats or ships on the water may feel nothing beneath them. They may have no idea what’s going on beneath the surface. But if those ships are closer to shore, it’s a different story. The closer to land the wave gets, the more concentrated the power. It also slows down a bit, but the height increases.

Ok, so back to the waves. Water travels out across the ocean as well as landward, flooding the shoreline. The distances these waves can travel is really mind-boggling. Again, that . . . this is because tsunamis are waves that—as opposed to regular waves—don’t break and, therefore, hold their energy over a very long
distance. And so, now, is a tsunami a huge single wave? Actually, uh, tsunamis are what we call “wave trains,” a sequence of multiple waves. Slide 3 attempts to show this.

This is just like what happened in the 2004 tsunami. It originated in Indonesia, but it caused extensive damage to fishing villages on the Somali coast at the other end of the Indian Ocean. When a wave approaches the shoreline, it builds in height. The topography of the coastline and the ocean floor will influence the size of the wave since the height of the wave is dependent on the depth of the sea floor. As we have said, there will normally be more than one wave and the succeeding one may be larger than the one before. So, this means that there could be a very small tsunami at one beach and a giant wave at just a few miles away.

Did you know that before the 2004 tsunami hit the coast of Sri Lanka, many children ran to the shore out of fascination for the receding waters, and, and many adults came to gather the fish lying on the normally unexposed beach? If these people had been warned of the impending strike, thousands of lives would have been saved. This means both education and technology are needed. By education I mean, teaching people in high-risk areas what to look for prior to a tsunami.

So what are those warning signs? Interestingly enough, one of these is actually the behavior of animals. It seems that many animals sense the oncoming danger and flee to higher ground before a tsunami wave hits shore. It was noted in Sri Lanka in the 2004 Indian Ocean earthquake. How do the animals sense this? I don’t know if we can ever determine this, but there are those scientists who speculate that animals may have an ability to sense subsonic waves from an earthquake minutes or hours before a tsunami strikes shore. Others feel that the most likely explanation for Sri Lanka was that certain large animals, for example, elephants, could hear the sounds of the tsunami as it approached the coast. While the human reaction was to run in the direction of the shore to see what was happening, the animals retreated inland. Educating local populations of the significance of this retreat of large animals may be a simple way to save lives in the future.

It is often the case that the part of a tsunami to reach land first is a trough, or a complete absence of water at the shoreline. In other words, the shoreline is completely exposed. These exposed areas are normally never exposed, which should serve as an advanced warning sign to local inhabitants.

Again education is the key here. Unfortunately, this trough often precedes the wave by only seconds or minutes. Even so, had residents along the shoreline had this knowledge, many may have retreated rather than approach the shoreline, which means that some lives could have been saved. Well, of course, one obvious indicator that a tsunami could be coming is that earthquakes typically cause tsunamis. Therefore, the earthquake is often the tsunami warning, but sometimes
it’s not much of a warning. In 2011 in Japan, the amount of time between when the earthquake registered and the tsunami hit Honshu was only 10 minutes.

Now, what can we do to warn people of impending disaster? While developing advanced warning systems for tsunamis has long been a priority of scientists, the 2004 disaster heightened this exploration and the discussion became more public. Many changes have been implemented since 2004 in these areas, and some were tested in April 2005 with success. Identifying and mapping areas of risk is key.

This happens in a variety of ways. First, geologists need to pinpoint the tectonic faults of concern in an area. They also need to map the sea floor topography, as this has an impact on wave propagation. With this knowledge, and through studying the effects of past tsunamis, computer models were developed showing how future tsunamis might behave. Much of this work had been done before the 2004 disaster, and there were some warning systems in place, but many failed. For example, the seismic data that is gathered can tell us quickly where the epicenter of an undersea earthquake is, but they, they cannot pinpoint the alignment of the rupture that is causing the earthquake.

What does this mean? Well, in the case of the Sumatran rupture, if experts had known that it was along a north-south portion of the fault, they could have predicted that the tsunami would have traveled mainly east-west. They would have been able to predict more accurately which areas lay in the path of the tsunami. Another type of technology in use collects sea surface movement information from a multitude of buoys distributed throughout the ocean. These buoys register the passage, the strength, and the direction of a traveling tsunami, and they process this information so that all the governments and organizations bordering the danger zone can alert the affected populations.

Now, when we hear about the report of on-land earthquakes, we seem to get an immediate report of the magnitude of the quake, don’t we? But in the case of tsunamis, it has been taking as long as two hours between the time the determination is made and, and the point at which those who track tsunamis are notified. Clearly, improvements in communication between these various agencies must be made. One expert tells us that every underwater earthquake of a magnitude 9 or more has resulted in a devastating tsunami. The Sumatran earthquake is believed to have been magnitude of um, 9.3. We need to figure out a way to determine those magnitudes far more quickly. If the media had known, say oh, 15 minutes after the quake that there was an impending tsunami, surely some people in its wake would have been alerted and saved.

Experts say that a tsunami will hit the West Coast at some point. Which areas are vulnerable? What kind of warning system is in place? Think about that.

Ok, your assignment. On the board, I’ve listed some of the biggest tsunamis: Chile in 2010, Samoa in 2009, Solomon Islands in 2007. You can pick older
ones too. You can pick the 2011 one in Japan, but you can’t choose the 2004 Sumatra one. Got it? You will need to pick one to research and write up a geological analysis of the events—that is, the cause of the earthquake and details and then details about the tsunami.

Remember the readings on assessing earthquake damage. There’s more information about the assignment on your syllabus, but don’t forget to talk about warning systems and to make recommendations. Bye.

[Track 6]

Unit 3: Economics: Inflation and Microeconomics

Listening 1: Student Presentation.

Listening for Problems and Solutions

OK, my presentation is on Chapter 4 of the Samuelson book.

It’s 1980, and things are not looking good from a numbers perspective. Since this is an Economics course, we need to look at the numbers. The numbers tell us an important story. Although inflation got as high as 13.5% in 1981, our story begins in 1980, when, according to sources, it was 11%. As you can see here, particularly concerning was that major industry pro, production was down, and by a lot. In today’s world, we hear about unemployment being near 9%, but this unemployment number (10.8%) in 1980 was the highest since the Great Depression. I mean, this was serious. In the aggregate, these economic indicators reflect the fact that bond investors had lost all faith in the government’s ability to control inflation.

One theme of Chapter 4 is that Samuelson argues that the course of human history has been defined either by great forces or great leaders. Samuelson says that Washington, Madison, Napoleon, Lenin, and even Hitler are examples of effective leaders. It really depends on the definition, doesn’t it? Keep in mind that being an effective leader doesn’t always mean accomplishing things for the greater good. According to Samuelson and other experts on history, leaders either define an era or are defined by it. There are things that can change history. This is important for his larger argument in this chapter—that Reagan and Volcker were great leaders, which takes us to the next slide.

So Ronald Reagan, the 40th U.S. President, and Paul Volcker, Chairman of the Federal Reserve, have to deal with these horrible economic indicators. It's not in the chapter, but some people don't realize that Volcker is still around as, and was appointed by President Obama to serve on the Economic Recovery Advisory Board from 2009 to 2011. Reagan and Volcker were an unlikely alliance, but they both shared the same conviction that high inflation was a big problem and was tearing apart the very fabric of the economy and the American society. A
solution to this problem was sorely needed. This partnership was ultimately so effective because Reagan gave Volcker time to make his plan a reality, while Reagan provided all of the political support. Volcker’s solution was to attack inflation through higher interest rates and tightened credit.

Reagan was offering political support, but things got worse because, before they got better. Despite attempts by the Senate (and Senator Byrd), as the slide shows, to contradict the policies of Volcker and even as his approved, approval rating plummeted, Reagan remained stoic in support of the Federal Reserve Chair’s proposed policies.

Let’s take a look again at those numbers from Slide 2. This is critical to understand what Volcker accomplished. Look how bad things were in 1981 when Reagan was inaugurated. As the economic indicators worsened throughout the year, people began to become more and more concerned that Reagan wasn’t going to get things better. People were worried. The public pressure on Reagan to lower interest rates intensified.

Ultimately, though, Volcker’s policies worked. After a rough 2 years, things brightened midway through 1983, as you can see.

But still a lot of damage had been done—and would continue over the next few years—as this slide shows. The so-called War on Inflation had many casualties. Some people call this war Reaganomics. Other names or labels are supply-side economics, trickle-down economics, or voodoo economics—depending on one’s economic philosophies. Here we see the major goals of the War on Inflation. Whatever you believe and whether you believe this could work today is irrelevant. At this point in time, Volcker’s ideas solved the problem. He more or less got the U.S. through a tough economic period. There is widespread agreement now that we had economic expansion from 1983 to 1990.

Samuelson’s point in this chapter was that the government could fix the country’s economic problems and that, in this particular case, the partnership between Reagan and Volcker was very much the reason why.

Thank you. Any questions?

[Track 7]

Listening 3: Lecture: Is Microfinancing the Solution?

Ok, we’re going to talk today about some of the readings, including the chapter in Half the Sky. So, Kristof and WuDunn’s book is one of the sources that showed us how microlending has become a powerful system to help people help themselves. They have written that microfinance has done more to bolster the status of women and to protect them from abuse than any laws, right? They wrote that capitalism can achieve what charity and good intentions sometimes
cannot. And we read that in other texts in this course too. Okay, so what have we learned? Does microfinancing work everywhere? [mumbles]

Microfinance hasn’t worked nearly so well in Africa as it has in Asia, has it? What’s the problem? Is it because it is still new there and the models haven’t been adjusted? Or is it because populations are more rural and dispersed? Or, maybe because the economies are growing more slowly, making investment opportunities fewer. Kristof and WuDunn talk about these challenges in the book and in the video, right? So, while microfinance has been exceptionally successful in parts of Asia, it remains an imperfect solution. Women’s microbusinesses grow more slowly than men’s, according to some studies, presumably because women are supposed to work from home and look after children at the same time—and these constraints make it difficult for women-run businesses to graduate to a higher scale. Also, I’m sorry to report, in some countries, the women who got the loans for their businesses sometimes defer to men to make business decisions. In some cultures, the traditional gender roles—women at home, men at work—are so deeply embedded that it’s difficult for the women to truly “run” their businesses. But I digress. We’ll get more into this issue in a few weeks.

Okay, another part of the problem is that micro refers to the amount of the loan, not to the interest rate: It’s expensive to make small loans, and so borrowers must pay annual interest rates of 20 to 30%—a bargain compared to commercial money-lenders, but a level that is horrifying to Americans or Europeans.

The interest rate is fine when the money is pumped into a profitable new business, but if the money isn’t invested soundly, then the borrowers become trapped in mounting debts. Then they are worse off than before. You can review these ideas in the notes from last week.

Just for a minute, let’s review what we read about Bangladesh, specifically the famous Grameen Bank. Grameen means “village” or “rural” in the Bangla language. Professor Muhammad Yunus’s vision was to provide employment for the millions of unemployed in rural Bangladesh. As in most countries around the world, the poorest of the poor were kept out of the banking system and had no way to obtain loans. After all, how could the poor be reliable borrowers who could repay loans if they have no credit history, no assets, no property, no collateral? Central to Yunus’s work is his belief that the poor are “credit-worthy.” Following a number of successful pilot projects in the late 1970s, the Grameen Bank Project was designated as an independent bank by government legislation in 1983.

Remember that the premise behind microfinancing is that if people are given the chance to realize small economic pursuits by receiving loans with reasonable conditions and terms, little by little, they can rise out of poverty. Key to the success of microfinancing is accountability and trust. With no collateral, as with tra-
ditional loans, how can a bank have some guarantee of repayment? Wouldn’t it seem logical that banks would not provide credit to those with no collateral? I’m seeing some blank faces. Should I review how the loan works? [mumbles]

Okay. So, let’s say that five people in a rural community volunteer to form a morally binding group. Look up that term in your notes if you need to. To start off with, two people in a group may apply for a loan and if they prove themselves reliable borrowers, repaying loans on schedule, then two more members can be added to the group. If they fulfill their obligation, a fifth borrower is added to the group. In the Grameen Bank system, there is no joint liability. That means that other group members aren’t liable if someone in the group defaults on the loan. Now in some other microfinancing schemes around the world, there is joint liability, and if one doesn’t repay, the others have to pay for that person. And if they don’t, they won’t have access to future loans. But that isn’t the case for the Grameen Bank. So why do you think people pay? A lot of people believe it’s because mutual trust is established. This is what we call social collateral. This is at play when non-payment of loans would affect one’s reputation in the community. This social collateral has been found to have a profound effect on borrowers’ commitment to the group. As a result, development agencies throughout the world use microfinancing as a tool for economic development and empowerment.

This has really worked for women. In Grameen’s case, it became apparent that not only were they the most reliable borrowers, but they were also the most entrepreneurial. This allowed them to be far less dependent on their husbands. It has also provided women with a means to improve their living standards for themselves and for their children. Many have been able to put their children into school for the first time. You already know that the advent of commercial production in the world changed gender roles throughout the world. Division of labor by gender emerged with men working outside the home and women inside, which led to paid work for men and unpaid work for women. Of course, this continues today and is a topic for a separate lecture.

So we already know that disparity between genders in rural areas around the world is prevalent, including in the areas of education, literacy, health and nutrition, decision-making, and participation in politics, just to name a few. You know the famous quote: “If you want to awaken a country, first awake women. If a woman is awakened, a family is awakened, and when a family is awakened, a village is awakened, thereby an entire country is awakened.” Find that in your book.

One 2001 report indicated that 14.2 million of the world’s poorest women had access to microfinancing. The poorest is defined by the Microcredit Summit Campaign as those in the bottom half of everyone living below the poverty level
in their country. According to that report, women accounted for nearly 74 percent of the 19.3 million people being served by microfinance institutions. What do you think those numbers look like today? Even though women have excellent repayment records, they continue to face obstacles, often due to prejudice against them as entrepreneurs. There are enumerable factors that contribute to the economic success or failure of women receiving loans. As you can imagine, just providing the financial means to initiate and sustain a business is not enough. The status of women within a group has to be considered, including their level of education and other responsibilities they hold. In most cultures, women are still responsible for child rearing and the functioning of the household. Literacy levels are generally far lower for women than for men. And then we need to consider how the consequences of financial stability are viewed within a woman’s cultural context. Does empowerment of women mean the same thing everywhere? And, is empowerment and financial stability considered desirable by those in power?

When an M.F.I. in Bolivia introduced microfinancing, it found that clients with health problems often had problems with loan repayment. As a result, it created a microfinance plus health care model, including health education and preventative care. The M.F.I. uses what it calls a focal point model, with centers in highly populated areas. Clients are required to stop at the focal point centers once or twice a month for loan repayment, at which time they also receive health services. In fact, health training is required of all loan recipients. By grouping financial and health services, M.F.I.s like this one can see a reduction in the cost of service delivery and increase the scale of their projects.

Microfinancing for women exists in countries that have an overall stronger economy than some of the other countries we’ve looked at. In Russia, for example, an innovative M.F.I. specifically for women solicits grants from international donor agencies. Those grants are received in U.S. dollars, which are then deposited in a loan guarantee fund at a reputable bank. Then the loan guarantee funds are invested in interest-bearing accounts in U.S. dollars. The interest income earned covers the M.F.I.’s operational expenses, which in turn can allow it to attain self-sufficiency. The loans and repayments are made in local currency.

The hot thing now is microfinancing online. One such microfinancing website had, in its first year alone, 250,000 visitors, raised $430,000 in loans in $25-dollar increments from more than 5,400 users, and provided capital for 750 microenterprises in 12 developing countries in Africa, Asia, Eastern Europe, the Middle East, and Latin America. The website connects individual lenders to individuals in need of loans.

Microfinancing is quite popular. To me, the experiment in Pakistan is particularly fascinating. You’ll read about Kashf in the book. Kashf means “miracle,”
which is appropriate, right? The Pakistanis told organizers it was impossible for something like that to work in a conservative Muslim country like Pakistan—that women would never be allowed to borrow.

But it’s working. I am interested in the fact that Kashf started a bank so that it could accept deposits as well as make loans. Everyone thinks microfinance is all about loans, but savings are perhaps even more important. Not everyone needs loans, but all should have access to savings accounts. What an important point! And if the family savings are in the woman’s name, and thus in her control, that gives her more power in terms of family decision-making. Kristof and WuDunn reported that an inhouse evaluation concluded that by the time the borrowers have taken their third loan, 34 percent of them had moved above the poverty line in Pakistan. And there was that poll. Um. In the poll, 54 percent said their husbands respected them more, and 40 percent said they had fewer fights with their husbands over money.

So, think about these questions: Is the microfinancing model sustainable with 7-1/2 percent R.O.E.? Is microfinancing the magic bullet for some countries?

Ok, that’s it for today.

DISK 2

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[Track 2]

Unit 4: History: Ancient Civilizations

Listening 1: Student Presentation.
Listening for Supporting Details and Evidence

The development of sports and leisure activities throughout history can tell us a lot about social changes. We can find evidence as far back as 30,000 years that sport and leisure activities existed. My presentation today will look mostly at sports in Roman times.

The evolution of sports in ancient times shows us how important it was for human existence. It was a way for people to master their environment. In Roman times, sports was less about voluntary pursuits for leisure, though, and more representative of the, of the oppression of the time.

As we go further back in history, it can be hard to find evidence to support our claims. That said, studies have reported a few examples in France, Africa, and Australia of pre-historic cave art—some of it more than 30,000 years old. The existence of art is evidence that humans had leisure time available. It is
therefore possible that there were some activities at some point in history that resembled sport.

Let’s jump forward to 3,000 BCE in Sumer. Sumerian stone slabs dating back to 3,000 BCE show wrestlers. In fact, it seems that wrestling was among the earlier and more popular sports. To illustrate, look at ancient burial chambers in Egypt dating back to 2,400 BCE. These show wrestlers in action and the base of a vase from Iraq dating from 2,600 shows wrestlers as well.

In Ancient Egypt, other sports such as swimming and fishing were well developed and regulated several thousand years ago. We know this because Monuments of the Pharaohs around 2,000 BCE confirm many sports, including javelin throwing, high jumping, swimming, and fishing. In fact, fishing hooks have been found in excavations in Ur, showing the existence of fishing in Sumer at the same time as well.

A wide range of sports were played in Ancient Greece, among them wrestling, running, discus throwing, and chariot racing. It is reasonable to assume that the military culture of Greece was an influence in the development of its sports. In Greece around 1,500 BCE, bullfighting and bull leaping is depicted in Minoan art of Bronze Age Crete. It was the importance of sports that led to the creation of the Olympic Games in Greece, with the first Olympics recorded in 776 BCE.

As we have been discussing in this class, an important attribute of the Romans was their ability to assimilate ideas and customs from the cultures and societies that they encountered. Roman sports were highly influenced by the Greeks. While the Greek sports were artistic in many ways, Roman sports were more about developing and strengthening the body for military purposes. Furthermore, for much of Roman sport, the emphasis was on spectacle and violence. Gladiators are a case in point. The art and writing of the time documents this violent practice.

The gladiator games, originally established by the Etruscans, were adopted by the Romans for entertainment. Public spectacles took place in amphitheaters like the famous Colosseum in Rome. Initially, rich individuals organized games to gain political favor with the public. Later, the emperors took complete control and began staging public entertainment, which included chariot racing in the circus, hunts of wild animals, public executions, theatrical performances, and gladiator fights. Gladiators were typically picked from prisoners of war, slaves, and sentenced criminals. There were also occasional volunteers who were trained in special gladiator schools. Female gladiators were thought to exist because of literary references, but it wasn’t until the year 2,000 that evidence was found—the remains in a gladiator’s grave were those of a woman.
We continue to see many examples of combat at the center of sports to this day: wrestling, boxing, kick boxing, and even ultimate fighting. What could it be about humans that draws us to this kind of sport? Sport continues to play a large role in our lives. In the past two or three centuries, running or jumping, which were originally done for survival, have become activities done for pleasure or competition. An increase in leisure time in the 19th and 20th centuries in developed countries had a big impact, leading to major growth in spectator sports because it was possible for more people to play and watch.

Recently, we see evidence of the ancient world in the move toward adventure and extreme sports like white-water rafting and bungee jumping. And let’s not forget about all the electronic forms of entertainment we find today, which unfortunately, may be keeping young people away from the sports field. Many of those games are no less violent than the spectacles in Roman amphitheaters.

Thanks.

[Track 3]

Listening 3: Lecture: Augustus and the Roman Empire

What I want to do today is to continue on through our rapid tour of Roman history from the foundation of the city to the reign of Augustus. Remember that Augustus was the founder of the Roman Empire and its first Emperor, ruling from 27 BCE until his death in 14 CE. Again, you will find a few of the names that I am mentioning and going on about on your list for this Friday, the quiz, which, just to repeat: there will be 10 short answer questions taken off of that list. The TAs will be going over this at the end of class today. The names and concepts on that list are, of course, fairly central to the things that I have been talking about in the lectures, and it will enable me to, uh, see how people are doing with the content.

What I want to do today—technology permitting—is to have a look at this object, which is called H-double-oh-two. This document is the political testament, essentially, of the emperor Augustus. It is really a key statement as to what made the Roman monarchy work. As you browse this document, which has a tendency to show up on exams on a regular basis—[ahem] not to be completely unsubtle—you will see that it has a lot of notes attached to it. Get into the habit of clicking on the notes section in the course management system when you are doing assignments later on in the term. The notes will really, I hope, help you a very great deal to figure out what’s going on.

Okay. Ancient documents, as we have seen and as you’ve read in your textbook, are very tricky things. They are not simple stenographic records of anything. They are very carefully composed with a point to them. They are designed
to tell a quite particular story, and there is perhaps no way or no document that we have in the ancient world that tells a story in a more complex way than the, than does this text, which is H-double-oh-two. Okay, now let’s see if we can find it. Will the technology work?

Okay. Looks like it’s working. As we’ve seen repeatedly in this course, any text that you find in antiquity will very often need a great deal of interpretation. We’ll examine this more closely later, but the theme of today's lecture is the emergence of the monarchy, or how the empire made the Roman democracy impossible.

We ended last time with the beginnings of political unrest in the march of Sulla on Rome, very briefly. But we want to go and take a few steps before we continue with that story. The main points of this lecture will first of all be the process of alienation. No political society is going to fall apart if people are happy with it. One of the keys to the collapse of the Roman democracy is, quite plainly, that people were distinctly unhappy with it. This leads to the rise of individuals with enormous power, where an individual can command so much support within the state that the apparatus of the state cannot take any action against that individual. This is a state that is in serious trouble indeed. And Augustus doesn’t come from, just sort of nowhere. We know this because the Roman monarchy that’s established by the time of Augustus comes at the end of a series of events, and Augustus is the last in a series of figures that really dominated Roman political society. We’ll look at the reasons for his success, and then we’ll look at how to read H-double-oh-two and what it tells us about Augustus, what it is as a piece of propaganda, and as a reflection of the main groups that have influence in Roman society.

Now why should you know this? First and foremost, the rest of what you will read in this course presumes that you have a fairly clear idea of when the emperor Augustus lived, and what he did. Without having a sense of Augustus, a lot of the rest of what we are going to talk about in this course makes no sense because the Roman imperial system of sports and entertainment is dominated by the office and person of the Roman emperor, and the establishment of imperial control over public entertainment is a feature of the time of the emperor Augustus.

You will not be tested on the fall of the republic directly, but it’s good if you can remember the general process because, again in the readings, you’ll see these constant references to the republic and empire. Keep in the back of your mind that this is a process occurring in the first century BCE and coming to an end really in the second-third of the first century BCE. The bulk of the material we’re going to be talking about in this course will either cover very much earlier or much later in the first, second, and third centuries CE.
But this is the critical and pivotal period in Roman history where we see this transformation from democracy to monarchy. And the first thing to remember again in this class, when we look at the Roman empire, we're looking at an empire that consists of a lot of different states. And those states retain their traditions, and those traditions will sometimes shape the broader spectrum of Roman culture. I would argue that there is perhaps no better example of this to keep in mind than the fact that the single most influential intellectual movement in Roman history began with a man who did not speak Greek or Latin, but Aramaic. It began with a man who did not live in Italy or Greece. It began with a man who lived in Judea and was not a man of great wealth. The Roman empire or the intellectual world of the Roman empire in the fourth century CE is transformed in part by the interpretation of the thought of a man who lived in the first century CE and whose only contact with Roman imperial government was being crucified by a Roman governor.

When we start talking about Roman entertainment more broadly, we'll look at theatrical traditions that grew out of Greek athletic traditions, and the reason why they are different from Italian traditions is that they have a whole different history behind them. Very often non-Roman traditions and non-Roman ideas will supersede ideas that emerged in Italy and will become more powerful than ideas that emerged in Italy. This is again a critical fact about the Roman empire. It is evidence that the Roman empire does not export Roman culture to the exclusion of everything else. There is a constant dialogue between Italian culture and the culture of conquered peoples.

So, this process of conquest begins with what we might call defensive imperialism, the creation of an empire in the western Mediterranean, to protect Italy from Carthage. It continues at the beginning of the second century, with the acquisition of an empire in the eastern Mediterranean. This might be called revenge imperialism, beginning with an attack on the king of Macedon who aided the Carthaginians in the second war. If you look at the names of the wars again, first and second Punic wars—that's in western Mediterranean—they take up the latter half of the third century BCE in the west. Then you have the Macedonian and Syrian wars, which is Rome moving east in the first part of the second century BCE, and the destruction of Carthage. We go from conquest to revolution.

The second phase of this development is in the second half of the second century BCE, um. The key figures are first of all Tiberius and Gaius Gracchus—remember I mentioned him at the end of last class?—were the first people to seriously propose using the goods of empire, the profits of the empire, to fund social programs in the city of Rome. Prior to the latter part of the second century BCE, the Romans had not gotten used to the idea that it was possible to turn a
profit from the empire because the areas that they had acquired from Carthage
to defend themselves against the Carthaginians could, on a good day, pay the
support of the troops used to garrison them, and on a bad day were a financial
drain on the Roman state. The Roman empire was not built for economic rea-
sons. Without a doubt, this is very different from European empires in the 18th
and 19th centuries where both national pride and notions of economic expansion
go hand in hand.

The second phase of the revolution is an actual war, the so-called Social War
between Rome and its allies. It broke out because the Romans refused to share
the goods of the empire with the mass of Italians who had helped them gain that
empire. And again as you recall, Rome is just one part of Italy.

We begin as we did last time with the figure of Gaius Marius. Marius was
never the single all-powerful legislative figure. He was a very good general at the
end of the second century BCE. He had enabled the Romans to drive back
invaders from the Germanic north, and this made him a hero. He was elected five
times in a row. This is unprecedented in Roman history, and it reflects a sudden
need for expertise. In the late second century, the standard of generalship was
remarkably low, and if you could find anyone who could keep the army from
being destroyed, then you want them in charge. And that’s what Marius did. He
was not a member of the traditional aristocracy. He was something of an out-
sider. The blue-blooded Roman aristocrats—the Rockefellers and Fords of the
Roman world, if you will—couldn’t stand it. They looked at him as a guy who
had risen to power but who didn’t have the social background or education that
they did. He wasn’t a trained politician. He lacked political skills. People could
take advantage of him, and after a period of enormous influence at the end of the
second century, he dropped out of political life for a decade. He re-emerges later
as a symbol of opposition to the aristocracy in 88, which was part of pol, the
political confusion that led to Sulla’s march on Rome. It was Marius who was
given the command in the east, and it was Marius—could I have the slides,
please? It was Marius who would’ve led the army, and it was to prevent Marius
from doing that and to acquire the spoils of victory for himself that Sulla, who
once served under Marius, marched on Rome.

It’s Sulla who changes the rules. A Roman army had never been used against
the Roman people in the history of the republic. Skipping ahead, this changes in
88 BCE when Sulla goes to his men and he says to them, “Look here, guys. I am
your general, and anything we get in the war comes through me. So you owe me
more than you owe the state.” He convinced them that they had been deprived
of making more money by the politicians in Rome and so they marched on
Rome. This is typical of how an individual could take armies of 20,000 or
30,000 men who were unhappy about their lives, who were losing their land and felt they were losing everything. So they were willing to follow Sulla.

To make a long story short, he is a good general and generalship matters. But he also becomes a sort of a dictator. He posted the lists of people who he considered enemies and if your name appeared on the list, you were sentenced to death. Obviously, we've seen this type of thing again and again in history. Sulla intended to recreate a new political class in Rome, entirely based on loyalists to himself. Unfortunately for Rome, he liked to drink a lot, and he died of drink in 78 BCE. But historical accidents matter. Sulla was a relatively old man when he achieved supreme power, and he was in very bad health in large measure due to his own personal habits.

If Sulla had lived another 30 years, I'm convinced that Roman history would've been completely different because we would not have had an emperor Augustus. The Roman monarchy would’ve been established on different principles, those by Sulla. He clearly had some designs in this way, and he had a general behind him by the name of Pompey who was a young man. And he wanted Pompey to succeed him, but Pompey didn’t have the kind of political experience that Sulla had and was really quite a bad domestic politician but a very, very good general.

Sulla’s political inability left him wide open to be unseated ultimately by Julius Caesar, and then from Caesar to Antony and Cleopatra, and then emperor Augustus. Oh, this is the good stuff—Caesar and Cleopatra, but we are running out time if we want to review for that quiz. And I think we want to do that. But before we go today, keep in mind this process: conquest, revolution, dictatorship. From the third century to the second century to the first century—what were the consequences of conquest that led to revolution and dictatorship? I promise we’ll get to Caesar and Cleo next time.

Ok, I’m going to leave it there for today so you can talk to the TAs regarding the quiz.

[Track 4]

Unit 5: Health Sciences: Neurological Disorders

Listening 1: Student Presentation.
Listening for Statistics and General Information

Did you know that according to U.S. Centers for Disease Control and Prevention, the third leading cause of death in the United States is stroke? It is also the leading cause of serious, long-term disability. A stroke occurs when brain cells suddenly die due to lack of oxygen. There are different causes for stroke, including an obstruction in the blood flow to part of the brain or the rupture of an
artery that feeds the brain. When this happens, the stroke victim may lose the ability to speak, have memory problems, or experience paralysis in one side of the body. Today, I will present information about the frequency of stroke in the U.S. and around the world, define the two main types of stroke, and discuss the primary causes, symptoms, and current treatments for stroke, including some of the new in, innovations. Finally, I'll share some ways to, to prevent stroke.

Let’s look at some numbers. In the United States, more than 140,000 people die each year from stroke. About 795,000 people suffer a stroke each year. Most of these, 600,000, are first attacks and 185,000 are repeat attacks. Nearly 75 percent of all strokes occur in people over the age of 65. On average, a stroke occurs every 40 seconds in the U.S.

You can’t ignore the numbers reported by the World Health Organization; they paint a similar picture around the world. Worldwide, 15 million people—a large proportion of the population—suffer strokes each year. Of these, 5 million die and another 5 million are permanently disabled. There have been some positive trends in developed countries, where the incidence of stroke is declining. This can be attributed to efforts to lower blood pressure and reductions in the number of smokers.

On the flip side, the overall rate of stroke remains high as the population ages. I now want to turn to the two main types of stroke. The more common of the two, ischemic stroke, occurs when a blood clot, or what is called thrombus, forms and then blocks the flow of blood to part of the brain. A blood clot can form somewhere in the body, break off, and then become free-floating, in which case it is called an embolus. This traveling clot may be carried through the bloodstream to the brain and cause ischemic stroke.

The other most common form of stroke, called a hemorrhagic stroke, occurs when a blood vessel on the brain’s surface ruptures and fills the space between the brain and skull with blood or when an artery in the brain bursts and fills the neighboring tissue with blood. In either case, the result is a lack of blood flow to the brain and a buildup of blood that puts too much pressure on the brain. Okay, so now let’s turn to the risk factors and causes of stroke. How many of you are smokers? Well, you may want to reconsider because the risk of an ischemic stroke for smokers is double that of non-smokers. High blood pressure is the most important risk factor for strokes. Rates are higher in men and among American, Hispanic, or Asian or Pacific Islanders. A family history of stroke puts you at greater risk as do certain diseases such as diabetes and cardiovascular disease.

One risk factor you can control through diet and exercise is obesity. Women taking birth control pills or other hor-, hormone therapies are also at greater risk. A study in France showed that heavy drinkers have a considerably higher
risk of stroke early in life compared to others. Another interesting finding was that divorced men with families have a higher incidence of stroke than those who are married.

Having looked at the rates and causes of stroke, I’d now like to share the signs that someone may be experiencing a stroke. As you will see in a bit, getting immediate treatment is crucial, so recognizing when someone might be having a stroke can improve the chances of recovery, or save a life. Common symptoms include speech problems, sudden vision problems or a severe headache, numbness, dizziness, trouble walking, or loss of balance and coordination. As you can imagine, the outcome of a stroke depends on how much of the brain is affected. Smaller strokes may result in minor problems, such as weakness in an arm or leg.

On the other hand, major strokes can lead to paralysis or even death. I think we need to focus on treatment of strokes. The ideal, immediate treatment for an ischemic stroke is to give a patient clot-dissolving medication as soon as symptoms occur. Medication should be given immediately, and this can even be a blood-thinner such as aspirin. Until recently, it was believed that the drugs must be given within 3 hours, but research in the U.S., Belgium, and Germany has shown that, in most cases, the window can be expanded to four-and-a-half hours after the onset of stroke symptoms. When clot-dissolving drugs cannot be used or are not effective, or beyond that initial short window of time, a clot can sometimes be removed surgically. A hemorrhagic stroke must be treated surgically.

In any case, most stroke victims will require rehabilitation through speech, occupational, or physical therapy. The followup to a stroke depends on the area of the brain affected and the amount of brain tissue damaged. Recently, researchers in Massachusetts have experimented with a robotic device that patients squeeze with their hands. Researchers have found that patients regained brain function as long as six months after the stroke. In their study, there was significant increase in activity of the cortex of the left brain, which lights up when the right hand is used. Most promising is that this part of the brain remained active even several months after patients stopped doing hand exercises.

To wrap up, let me turn to some examples now of what I propose people do to prevent stroke. I feel that most of this is basic common sense about healthy living. You’ll see that there are many things over which you have a lot of control.

- Don’t smoke (or quit smoking).
- Eat healthy foods, especially things rich in antioxidants, such as tomatoes.
- Drink alcohol moderately.
- Manage your stress.
- Get plenty of exercise—increasing your exercise so that you walk 20 minutes every day has shown to make a difference.
- Monitor your cholesterol levels.
• Know and control your blood pressure.

If you have older family members that you, you are concerned about, share these ideas with them. If everyone takes these steps, I generally believe the overall number of stroke victims can decrease. Thank you.

[Track 5]

Listening 3: Lecture: Aphasia and Assistive Technology and Communication

Okay, this is the first of two days we'll be talking about augmentative and alternative communication and so first we’re going to talk about what communication is and one of the things that we obviously think of with communication is speech. One of the things that can go wrong affects the ability to remember names. Aphasia would be one diagnosis for forgetting names although I tend to forget names and nouns occasionally and don’t necessarily have an aphasia, but . . . .

Student: Um, excuse me?

Professor: Uh huh.

Student: Is it Wernicke’s aphasia that’s the understanding speech one?

Professor: Wernicke’s aphasia is damage to Wernicke’s area of the brain. It IS the one that goes with the understanding ’cause that’s the connection from the hearing area of the brain to the rest of the brain.

Let’s back up. Aphasia basically is a difficulty in understanding or producing speech that’s caused by brain, ah, damage. There’s a story here. I have an uncle who has an aphasia and really confused the doctors when he was a kid in the late 1940s. They’d take him to one doctor, and the doctor would put a tuning fork in his ear and he’d look around and say, “He can hear fine. I don’t know why you brought him to see me.” Then, they’d take him to another doctor, and the doctor would talk to him, and my uncle wouldn’t understand or respond, and they’d say, “He’s deaf. What are you bringing him to me for?” So the thing is that he can hear and he can play the piano, but he can’t understand speech. The part of his brain that turns sounds into intelligible words is damaged. And it’s actually kind of interesting when I talk with neurologists. Every once in a while, I’ll talk to them and describe my uncle and they’re all very interested. They say, “You mean he can write and he can play the piano, and he can read but he can’t understand the spoken word? Well, that means it’s probably damaged in that part of the brain.” It turns out that my uncle has a very small lesion. The doctors are fascinated.
But let’s get back to the topic: So there’s a receptive aphasia, where there’s damage in the parts of the brain that are involved in hearing and translating what’s heard into something that’s meaningful. Then there is an expressive aphasia where you can still produce words just fine. The coordination works well, but maybe you can’t remember the words, or maybe the words that you remember as having a particular meaning are not the words that everyone else who speaks your language remembers as having that same meaning. By the way, there’s a fascinating “Star Trek Deep, ah, Deep Space Nine” episode called Babel where everyone came down with expressive aphasia due to some virus. Cool, huh?

But aphasia is one of these conditions where it can be very frustrating, ’cause you know what you want to say but you can’t. And if you have only have the expressive form of aphasia, you can understand what everyone else is saying fine, but you can’t produce speech and you can’t get anyone else to understand what you’re saying. There’s something wrong with everyone else, or there’s something wrong with you.

Expressive aphasia can be forgetting vocabulary. And it can be not being able to put things together into a sentence, basically forgetting the rules of grammar and the rules of sentence structure that are appropriate for the language that you’re speaking.

So let’s look at conditions that cause speech impairments. What kinds of speech impairments would these different conditions cause? I assume I don’t need to cover the conditions that cause speech impairments because you’ve read about them in your textbook, right?

Ok, now then let’s get back to my introduction of today’s lecture. Let’s look at the definition of augmentative and alternative communication, which we will henceforth call AAC. What does it mean to augment something? We’re adding functionality or something, right? And something different. So it’s important when we’re looking at assistive technology for communication that we, ah, rely on both of these. We want to augment the person’s—well, whatever ability he or she has for communicating. It might be that they shake their head or blink their eye for yes and no. So you want to utilize that in the situations you can and you also want to provide alternatives so the person becomes as fully functional as possible.

There are stacks and stacks of communication devices, so many types of devices. This is because some engineer’ll have a child with a disability, one where the child can’t communicate and the parent won’t know about the assistive technology that’s available and come up with something to solve the child’s problem. And then, of course, their friends hear about it who also didn’t know about the assistive technology, and so maybe they start a little company. Then they go to try and sell their wonderful product that’s going to solve everybody’s problems,
and that’s when they find out that there’re actually quite a few products out there already. Some of the companies survive, and some of them don’t. Augmentative and alternative communication is typically used to refer to communication that uses something other than the person’s own body for communication. However, to really be effective, you often want to use multimodal communication that combines different aspects. So if all you want to say is be able to say no, you really don’t want to have to type in the right buttons. So, say you want to express to someone that whatever they just gave you to eat you really didn’t like, there are far more efficient ways to do that than typing out “I did not like what I just ate.” [laughs]

So whenever possible, you want to incorporate gestures, and devices to meet all the different needs that a person might have. There are different types of communication that can get lumped into the graphical communication category. Writing is very different, actually, even though it’s the same language. Now, the advent of email—and to some extent texting—has blurred that somewhat in that we, that, uh, we treat email as a conversation and tend to ignore all the formal rules of writing. By the way, you might have noticed: One thing I’m doing on your papers is going through and circling all the contractions because you shouldn’t use contractions in formal or academic writing. You’ll thank me for this later.

Student: I have a question.

Professor: Okay.

Student: I kind of feel like probably one-third of the things that I communicate to people are just with gestures and if I didn’t have motor control, a lot would get lost. How do you compensate for that? Would someone with an aphasia be able to communicate with, like, sign language?

Professor: Depends on the aphasia. It’s actually kind of interesting. In my uncle’s case, yes, he actually was educated in a school for the deaf. If you have a massive aphasia, those areas that understand American Sign Language could be damaged as well. Back to my uncle, he apparently had a fairly small area that was damaged at a very young age. That’s an incredibly important thing in the brain, you know—how young you were when a damage occurred—because the brain really doesn’t stop developing until you’re in your teens.

But I want to return to communicating with devices. How fast do you have to communicate before people will stop engaging you in conversation or will get bored waiting for the next thing you’re going to say? How efficient does your communication have to be in order to be functional? Well, there’s been a little bit of research about that. If you start dropping below three or four words a minute,
you’re really gonna have trouble keeping the attention of the other person. I do have trouble concentrating on what my uncle is trying to communicate, ’cause he’ll write it out. He carries this little pad of paper around as his primary augmentative communication device—pen and paper. So he’ll be writing out something and while he’s writing it, I either have the choice of looking over his shoulder, which isn’t always possible, or I have to sit and wait and my attention wanders. I don’t mean to be disrespectful or anything but, my attention wanders. Then he’ll be done writing and I’ll read through what he said and it’ll be my turn to write something down. So for situations like this, how much attention do you have, and how much patience do you have, for that kind of communication?

So, efficiency can be a very important thing in evaluating how well someone can communicate. You gotta figure out exactly what the desired function is. What does the person need to communicate? With whom? In what environment? How quickly? What’s the level of vocabulary? What are they gonna use to control the interface? You have to have a control interface that the person can operate efficiently, and you want it to be as fully functional as possible. Does the person have the cognitive and language skills to use a communication system? How sophisticated can you make the system so someone can use it? For that matter, does the person understand the concept that the things that they do affect the world and can control the communication system? Does the person understand language when it’s spoken to them? To a certain degree, it’s very easy to provide a device that will speak for a person but much harder to provide a, uh, device that will provide the comprehension for someone if they don’t get it themselves.

You know, there are a few things you can do, but if someone has that receptive, uh, receptive aphasia, what you’re gonna end up doing is teaching people strategies, teaching them to use a picture board—point to what you wanna tell me—and teaching them strategies around it. Then what experience and what skills do they have in producing language themselves? Do they initiate conversations? Are they able to use the word-prediction or other rate-enhancement methods in producing their language? Can they produce sounds? Can they work with low tech?

Someone can either point or there’s the eye gaze to indicate which of the pictures the person’s looking at. And then you have all different high-tech stuff, all sorts of input methods to control interfaces: switches, a keyboard that is basically a whole bunch of switches, eye gaze systems that use cameras to pick up where your eyes are looking. Now there are even ones that will try to look at the activity of the occipital lobe and the visual cortex to pick up which thing someone is looking at.
Student: Professor.

Professor: Uh huh.

Student: If you can understand some things your uncle says, you could have some computer that would understand those same things and translate them into writing, couldn’t you?

Professor: You mean, and repeat them in a clearer voice?

Student: Yeah.

Professor: Definitely. Sometimes a person’s communication system will just be a microphone and an amplifier. They can talk, but unless you have a microphone right up against their face, you can’t really hear it especially if you’re in a noisy environment. I met someone at one of my professional conferences who used a system like that. And it was kind of odd at first talking to him because I could see that he was talking, but this was in an exhibit hall so there were overhead speakers making announcements and there were people all around talking. It took me a while to tune in to what he was saying, because it sounded like it was coming over a speaker. I mean, it was coming over a speaker, but I was trying to concentrate on what he was saying and I was consciously trying to tune out the mechanically produced sounds around me. It took me a minute to focus and say, oh, he is mechanically producing the sound that I’m trying to hear.

So in terms of these devices, they tend to find that there are certain groups of people who get good service with some of these. Children who have cerebral palsy—so some very obvious physical disability but have good cognitive abilities—tend to get well served. People who, or children who, have basically normally functioning bodies but can’t communicate tend to be very underserved because they don’t tend to get into the right programs. Then, of course, aphasias and brain injuries and strokes—these can be very difficult and can cause very big problems. How often do you see seniors—your grandma or grandpa—getting speech language therapy after a stroke?

Okay, well think about that and we’ll talk more about this next time.

[Track 6]

Unit 6: Engineering: Management Science

Listening 3: Lecture: Engineering Innovations: Tunnels

Tunnels and associated underground facilities represent a critical piece of the overall infrastructure of any developed region. Tunnels can function for either transportation or transmission purposes. Subways, railroad tunnels, and high-
way tunnels exemplify tunnels whose function is to provide transportation for trains, trams, trucks, and personal vehicles. Sometimes overlooked, water and sewage tunnels exemplify tunnels whose purpose is to transmit water or liquid waste. For the purposes of this lecture, large-diameter sewer pipelines greater that 10 feet in diameter are grouped as tunnels. Tunnels are used extensively throughout the world in both seismically active and seismically inactive regions. Overall, tunnels and underground structures have performed moderately well when subjected to earthquakes’ ground motions. Moreover, tunnels and underground facilities had experienced less structural damage due to earthquake ground motions than other surface structures. However, as society becomes more and more dependent on tunnels and underground facilities to perform everyday tasks, the consequences of failure tend to appreciate the order of magnitude.

Some tunnels and large-diameter pipelines are designated lifeline structures because they serve critical functions. For example, when one building is damaged in an earthquake, only the direct tenants and neighboring structures may be affected. On the other hand, if a critical tunnel is damaged in an earthquake, millions of commuters may be isolated from their homes, and emergency vehicles may not be able to access injured people on the other side of the damaged tunnel.

This lecture summarizes the current state-of-the-practice for seismic design of tunnels and other underground structures. Current seismic design procedures for tunnels grew out of both quantitative and qualitative observations of tunnel performance in historic earthquakes.

Tunnel design presents a sizeable engineering challenge for both geotechnical and structural engineers. Design for tunnels, and their associated underground facilities, is a highly specialized area of engineering practice. Because of the variable and uncertain engineering properties of geologic materials, tunnel design requires an iterative procedure where initial design assumptions must be reevaluated based on observed field conditions throughout construction. Many times geologic conditions will vary substantially along a proposed tunnel corridor. Seismic design of tunnels adds another layer of uncertainty to the design procedure. Seismic uncertainty is typically quantified and designed for by using both a maximum design earthquake (M.D.E.) and an operating design earthquake (O.D.E.). Tunnel deformation modes, due to either type of design earthquake, can be analyzed using both simple solutions that neglect dynamic soil structure interaction and complex solutions from numerical computer simulations. However, both analytical and numerical approaches need to be validated and analyzed in light of historical performance of tunnels during earthquakes.

Now let's talk about performance during earthquakes. Tunnels and underground structures are different than surface structures (i.e., buildings) due to
their long length and complete enclosure in either a soil or rock. For this reason, seismic design for tunnels and underground structures also differs from that of seismic design for surface structures. Tunnels, like beams, have a length that is much greater than their cross-sectional dimensions. Seismic performance of tunnels tends to vary based on the general type of tunnel. The three general types of tunnels are: bored or mined tunnels, cut-and-cover tunnels, and immersed tube tunnels—that comes from Power et al., 1996. Let me quickly review them.

Bored or mined tunnels are typically constructed with large tunnel boring machines (T.B.M.) in order to remove soil or rock and advance the tunnel. Bored or mined tunnels are used on projects where the vertical tunnel alignment is too deep for an open cut to be feasible. Additionally, bored or mined tunnels are used on projects where the existence of overlying surface structures makes an open cut unfeasible, according to Hashash et al. in 2001.

Cut-and-cover tunnel structures are constructed where the existing soil is removed by making an open cut, and the tunnel’s structure is constructed within this cut, and the soil is then backfilled on top of the structure. Many subways and highway tunnels use the cut-and-cover tunnel construction method.

Immersed tube tunnels are the third commonly used tunnel method. Immersed tube tunnels sections are constructed when a tunnel passes through a body of water. The first immersed tube tunnel was constructed for a railway crossing of the Detroit River in 1906. Immersed tube tunnels rest on the seafloor with minimal soil cover. Immersed tube tunnels tend to be the most vulnerable type of tunnel due to the lack of soil or rock confinement. Moreover, immersed tube tunnels must be seismically designed to remain watertight after an earthquake.

In terms of seismic performance, overall, the engineering understanding and methods of how to design earthquake-resistant surface structures (that is, buildings) is more advanced and refined than how to construct earthquake-resistant tunnels and other underground structures. So researchers St. John and Zarah stated in 1987 that “early understanding of how to construct earthquake-resistant structures was based purely on qualitative observation.” More recently, measurement and analysis have been used as the basis for development of improved design procedures. A similar developmental process is occurring for underground structures, but the process is far from complete at present. However, more data on the response of underground construction due to earthquakes has advanced the state of the practice since 1987.

The work of Hashash and his colleagues in 2001 updates the work of St. John and Zarah from 1987. For example, Hashash conducted an extensive literature review of documented studies of earthquake damage to tunnels and underground structures. This literature review consisted of more than 400 documented cases taken from published reports published from 1959 to 2000; there are too
many studies to mention here, but check your textbook. But Hashash and his group made ten general observations regarding the performance of tunnels and underground facilities in earthquakes. Ready for them? Okay, let’s go.

Number 1. Underground structures suffer appreciably less damage than surface structures.
Number 2. Reported damage decreases with increasing overburden depth. Deep tunnels seem to be safer than shallow tunnels.
Number 3. Underground facilities constructed in soils can be expected to suffer more damage compared to openings constructed in competent rock.
4. Lined and grouted tunnels are safer than unlined tunnels in rock. Shaking damage can be reduced by stabilizing the ground around the tunnel and by improving the contact between the lining and the surrounding ground through grouting.
5. Tunnels are more stable under a symmetric load.
6. Damage may be related to peak ground acceleration and velocity based on the magnitude and epicentral distance of the affecting earthquake.
Number 7. Duration of strong-motion shaking during earthquakes is of utmost importance because it may cause fatigue failure and, therefore, large deformations.
Number 8. High-frequency motions may explain the local chipping of rock or concrete along planes of weakness. These frequencies, which rapidly attenuate with distance, may be expected mainly at small distances from the causative fault.
9. Ground motion may be amplified upon incidence with a tunnel if wavelengths are between one and four times the tunnel diameter.
And, finally, 10. Damage at and near tunnel portals may be significant due to slope stability.

Some of these general observations are very intuitive. Can you tell which ones? [pause/mumbles] Take a look at Items 6 and 7.

Moving on . . . it is important to recognize the similarities and differences of earthquake damage to both underground and above-ground structures. Moreover, it is important to note that these are general observations and, given that, site-specific geologic conditions and faulting mechanism for a specific project may or may not follow all of these observed trends.

The design of tunnels in seismic regions requires three main steps. First, the seismic environment must be defined through a seismic hazard analysis. Either a deterministic or probabilistic seismic hazard analysis may be performed. However, probabilistic seismic hazard analyses are typically specified on new projects. Both an M.D.E. and O.D.E. are typically specified to be analyzed in the design of
tunnels because tunnels are considered to be critical lifelines. The ground motion parameters are then evaluated.

The second main step is to evaluate the ground response to shaking. This involves determining if large displacements will occur due to liquefaction, slope instability, or fault displacement. Finally, assuming small displacements occur, the tunnels should be analyzed for longitudinal extension and compression, longitudinal bending, and racking or ovaling.

Ok, that’s the lecture for today. Now I want to spend a few minutes talking about your final project.